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OF GROWING BREEDING FEMALE RABBITS:
ITS RELATION TO CHEMICAL COMPOSITION**

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FEEDING-GENOTYPE INTERACTION DURING REARING OF GROWING BREEDING FEMALE RABBITS: ITS RELATION TO CHEMICAL COMPOSITION

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ABSTRACT

The trial lasted between the age of 6 and 18 weeks. Female NZW rabbits have been divided into two groups: ad libitum (in the following AL) and 70% restricted (in the following: RS), 13 in each of them. As a basic situation, another analogues 10 rabbits were analyzed for major chemical components. The starting live weights practically were the same: 0.99 ± 0.08 vs 1.01 ± 0.08 kg, Group AL and RS, respectively. Using a time-shifted pair feeding, individuals of Group RS received the 70% of the previous day's feed intake of the appropriate counter partner. At the end of the week 18 after euthanasia the total body chemical composition has been measured. The final live weight on week 18 were in Group RS 84.7% (3.14 ± 0.24 kg) compared to the Group AL (3.71 ± 0.31 kg). In Group RS the average daily gain (ADG) proved to be lower (25.5 ± 5.6 vs 32.4 ± 3.2 grams), and at restricted feeding the head's growth was allometric to the whole body length as shown by the kyniklometric measurements. The daily water consumption in Group RS was higher (335 ml, i.e. 3.5 ml/g DM intake) than in AL animals (265 ml, i.e. 1.9 ml/g DM). The (apparent) digestibility of major nutrients significantly did not differ, except crude protein: 73.0 ± 2.7 vs 76.5 ± 1.4 , AL and RS group, respectively. The effect of feed restriction reflected in lower water and fat, as well a higher ash and protein content both in original whole body and in dry matter. Calculating the parameter of chemical maturity, one can state that 6-week-old rabbit did not reached chemical maturity, but at the end they did. Restricted feeding decreased the sexual maturity, i.e. the ovarian activity and responsiveness developed later; ovary contained less tertiary follicles.

INTRODUCTION

It is well known at other species (heifer, gilt) that the sexual maturity, i. e. the onset of the first fertile estrous and ovulation (puberty) depend mostly on the body weight and body composition, than on the age. ROMMERS et al. (1999) stated that the rearing period is the best to influence body development for optimum reproductive performance. Concerning the problem rabbit data are not available. In this study we compared the effect of ad libitum feeding versus restricted feeding. There are important breed related differences in case of the rabbit (FRAGA et, al., 1978; JAKUBEC et al.1985). Two series of experiments were designed to check the effect of genotype and feeding, i.e. one with New Zealand White (NZW) and one with Hungarian Giant. Hereafter data of NZW rabbits are given.

MATERIAL AND METHODS

The trial lasted between the age of 6 and 18 weeks. Female NZW rabbits have been divided into two groups: ad libitum (in the following AL) and 70% restricted (in the following: RS), 13 in each of them. To avoid the effect of photoperiod (ADAM et al., 1994), controlled lighting periods were applied (16:8 light to dark). To see the basic situation, another analogues 10 rabbits were euthanized by i.p. pentobarbital (Nembuthal) overdose, deep frozen, grounded and the major chemical components determined. For technical details see FEKETE and BROWN (1993). The starting live weights practically were the same: 0.99 ± 0.08 vs 1.01 ± 0.08 kg, Group AL and RS, respectively. Using a time-shifted pair feeding, individuals of Group RS received the 70% of the previous day's feed intake of the appropriate counter partner. The pelleted feed was a alfalfa-sunflower-oats based diet, with 88.8% dry matter (DM), 7.08% ash, 3.25% ether extract (EE), 14.96% crude protein (CP) and 15.77% crude fiber (CF). From week 12 the spontaneous sexual activity, as the responsiveness on GnRH or hCG injection and bock's stimulus have been checked, together with the blood progesterone level. At the end of the week 18 after euthanasia the total body chemical composition has been measured.

RESULTS AND DISCUSSION

The final live weight on week 18 were in Group RS 84.7% (3.14 ± 0.24 kg) compared to the Group AL (3.71 ± 0.31 kg). In Group RS the average daily gain (ADG) proved to be lower (25.5 ± 5.6 vs 32.4 ± 3.2 grams), and at restricted feeding the head's growth was allometric to the whole body length as shown by the kyniklometric measurements. The daily water consumption in Group RS was higher (335 ml, i.e. 3.5 ml/g DM intake) than in AL animals (265 ml, i.e. 1.9 ml/g DM). The (apparent) digestibility of major nutrients did not differ significantly, except crude protein: 73.0 ± 2.7 vs 76.5 ± 1.4 $p < 0.05$), AL and RS group, respectively. Tendency is similar to FEKETE and GIPPERT's findings (1981), who have found improvement of the digestibility of all nutrients, except fat after feed restriction. At the AL animals the food conversion efficiency (FCE) was higher (5.29 vs 4.73). *Table 1* summarizes de initial and final body composition of rabbit.

Table 1: Body composition of female NZW rabbits

Animals	n	Total body composition, %				Dry matter components, %			
		DM	Ash	CP	EE	Ash	CP	EE	FFDM
Before trial, 6-w	10	25.6	3.9	17.3	3.5	15.4	67.6	13.8	86.2
±SD		0.7	0.3	0.7	0.7	1.4	2.6	2.3	
End of trial, AL	13	37.3	3.1	19.2	14.7	8.4	51.6	39.0	61.0
±SD		2.3	0.3	0.8	2.9	1.0	4.5	5.7	
End of trial, RS	13	33.8	3.4	20.0	10.0	10.1	59.4	29.4	70.6
±SD		1.7	0.4	0.5	1.8	1.3	3.2	3.9	

Allometric growth of rabbit organs and body component was described by DELTORO and LÓPEZ (1985), as well as by PETERSEN et al. (1988). The effect of feed restriction reflected in lower water and fat, as well a higher ash and protein content both in original whole body and in dry matter. Finding are similar to those of BIKKER (1996) at gilts. PERRIER and OUHAYOUN (1996) similarly found that rationing at early age delayed skeletal development, but in age of 8-11 weeks mostly hindered fat deposition. One could state that the extra water ingestion have

not been retained in the body. Calculating the parameter of chemical maturity (MOULTON, 1923), i.e. ash/Fat Free Dry Matter (FFDM) (17.87, 13.77, 14.31) and CP/FFDM, % (78.42, 84.59, 84.14, before trial, after trial AL and RS group respectively), one can state that 6-week-old rabbit did not reached chemical maturity (see FEKETE et al., 1997), but at the end they did.

Similarly to the results of COUDEERT and LEBAS (1985), As well as MAERTENS (1984), restricted feeding braked the sexual maturity, i.e. the ovarian activity and responsiveness developed later; ovary contained less terciar follicles (*Table 2*).

Table 2: Data of the reproductive status

Parameter	Age	AL rabbits	RS rabbits
Signs of heat,%	w 13-15	75	40
*Sexually active ovaria,%	w 16	92	69

*Signs of heat and blood progesterone level after GnRH and hCG treatment.

Rabbit generally drinks 2 times as much water than the dry matter intake is (CIZEK, 1961). Restricted feeding caused a sensation of hunger, which on the other hand, increased water intake. The extra water only partly was retained (3.5% difference in dry matter content), and mostly diluted the feces and urine. Restricted feeding decreased final live weigh and fat content, parallel to increasing ash and protein content. The AL rabbits get the sexual maturity significantly earlier. Answer to hCG – owing to a lack or decreased number of LH receptors was weaker and the FSH and LH production of rabbits was lower.

Data suggest the significance of fat in the onset of puberty (FRISCH, 1994). Despite of the findings of HARTMANN and PETERSEN (1995, 1997), who found an improvement of reproductive performance of restricted reared does in second and third lactation, we are closer to the statement of ROMMER et al. (1999), that the development of the reproductive organs have the higher growth rate between weeks 10-18, that, considering the short longevity of does, there is no reason to practice feed restriction in case of growing female breeding rabbits.

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